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REMARKS

Claims 1 and 10-13 have been rejected as obvious under 35 U.S.C. 103(a) based upon prior art discussed below. Applicant has again reviewed the prior art references cited in the Final Rejection and submits that, for the reasons provided below, none of the prior art, considered alone or in any of the combinations proposed by the Examiner, renders any of the rejected claims obvious under 35 U.S.C. 103(a). Reconsideration and withdrawal of the obviousness rejections is respectfully requested.

Obviousness is assessed using 35 U.S.C. 103(a) and the factors opined by the Supreme Court in *Graham v. John Deere*, 383 US 1 (1966). The patent examiners are instructed, when applying 35 U.S.C. 103, to adhere to the following tenets:

- a) The claimed invention must be considered as a whole;
- b) The references must be considered as a whole and must suggest the desirability and thus obviousness of making the combination;
- c) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention; and
- d) Reasonable expectation of success is the standard with which obviousness is determined.

Manual of Patent Examining Procedure, § 2141 (8th ed., rev. 1, Feb. 2003). Of particular importance to this inquiry is whether the prior art, without the use of hindsight, suggests the desirability or motivation of their combination to produce the current invention as a whole. *Id.* When combining prior art, the art must teach or suggest the proposed combination as well as support a reasonable expectation of success. *Id.* at § 2142. The patent application itself cannot be used to support the combination of the prior art. *Id.* Additionally, dependent claims are nonobvious if the independent claim from which they are derived is nonobvious. *Id.* at § 2143.03.

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Long Term Stability:

Claim 1 has been amended to recite the feature of the claimed invention (as a preamble limitation) that calibration is not required for the pH electrode for up to two years. This language is based upon the following teachings of the application as filed:

The standard potentials as a function of time of five electrodes are displayed in FIGURE 6, GRAPH 1. Measurements were made by placing the electrodes in a pH 7.00 buffer and recording the potential after 5 minutes with a pH meter. Between measurements the electrodes were stored in de-ionized water. Reference electrolyte was maintained at a level higher than the test solutions by adding more as needed. A linear regression of the average of the five potentials yielded the equation on the graph. The equation indicates that the average drift rate was +0.0038 mV/day over the approximately two-year period the electrodes were tested. This is equivalent to about 1.4 mV/year or a pH change of about 0.02 pH units per year. The required accuracy for many, if not most, pH measurements is about 0.1 pH units. *This means that such an electrode could go for a year without calibration and still meet stringent accuracy requirements. Furthermore, the absolute average potential after nearly two years was about +4 mV. This corresponds to a pH value of about 7.07 when read on a meter that has never been calibrated, such that a potential of 0.0 mV will give a reading of pH 7.00. Thus, good accuracy can be obtained with these electrodes without any calibration, provided they are stored in water and the reference electrolyte is replenished at appropriate intervals.*

This feature of the claimed pH electrode is neither taught nor suggested by the cited prior art, and thus, the invention defined in amended Claim 1 is clearly not obvious. The previously cited reasons supporting the unobviousness of the claimed invention are

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repeated in this response, since they now are directly on point – as they discuss a claim limitation expressly recited in Claim 1.

I. Claim 1 of the current invention is not obvious under 35 U.S.C. 103(a) since the prior art fails to teach or suggest the vent configuration described in Claim 1 would produce an electrode that possesses long-term stability of the standard potential.

The Examiner rejected Claim 1 as obvious when compared to U.S. 4,608,148 (Frollini et al.) in view of U.S. 5,362,577 (Pedicini). In Frollini et al., the Examiner cited the description of a stable glass pH electrode (Col. 1, lines 7-8) that contained an “inlet hole” through which electrolyte solution can be added (Col. 4, 7-11). This patent does not have any specifications or claims for the size of the inlet hole (Col. 4, 7-11), nor does it discuss the stability of the electrode’s signal in terms other than the effect of temperature during measurements (Col. 1, lines 24-32, 47-50). In Pedicini, the Examiner cited a vent used in a battery “which exhausts gases generated within a battery while preventing excess water loss or gain within the battery.” (Col. 5, 8-11). Pedicini describes the desirability of a venting system in an electrochemical cell in terms of protecting the electrolyte solution, but does not suggest the effect of the vent on the electrical potential of the cell. (Col. 8, lines 3-24). The Examiner concluded that Frollini et al. and Pedicini were analogous art since both are from a similar problem solving area, that being electrochemical cells.

Claim 1 of the current invention describes the construction of a combination pH electrode equipped with a vent that has a stabilized standard potential. As explained in the current application, the reference electrode must allow electrolyte to flow through the junction, in this case under the influence of gravity, to prevent back-diffusion of the sample into the reference electrode. (Paragraph 0061). For this flow to occur, the reference electrolyte compartment must be vented to the atmosphere. (Paragraph 0061).

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If, however, the ion activity in this electrolyte solution is not kept constant, the stability of the reference electrode will be affected. (Paragraph 0060). The current invention addresses this stability issue by describing a vent that stabilizes the standard potential in the electrode while also preventing back-diffusion of the sample solution. This feature is now explicitly recited in amended Claim 1. It was previously believed that the preamble included this feature of the invention by the words "the standard potential of which is stabilized..."

The Examiner suggests that Frollini and Pedicini, when taken together, make it obvious that including a vent – as taught by Pedicini – in a pH electrode – as taught by Frollini – would minimize electrolyte loss and reduced contamination, thus resulting in less maintenance and more reproducible responses of the electrode. Claim 1, however, describes the construction of a vent that would result in a *stabilized pH electrode* over long periods of time. Figures six and seven of the application provide data to demonstrate construction of the current invention provides such stabilization over time when compared with an identical electrode left open to the atmosphere as taught by Frollini. While the Examiner has suggested possible functionality of a vent, neither Frollini nor Pedicini, taken together or separately, teach, suggest or support a reasonable expectation of success a vent that would produce a combination pH electrode with long-term stability of the standard potential. As such, Claim 1 is not obvious under 35 U.S.C. 103(a).

II. Claims 10 and 11 of the current invention are not obvious under 35 U.S.C. 103(a) since the prior art fails to teach or suggest the vent configuration described in Claims 10 and 11 would produce an electrode that possesses long-term stability of the standard potential.

The examiner combines the teachings of Frollini and Pedicini as discussed above with the teachings of US 5,143,621 (Bartram et al.) to conclude Claims 10 and 11 are

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obvious. In Bartram et al., the Examiner points to an elastomeric closure composed of a Teflon-lined silicone septum crimped using an aluminum cap to a 10 mL glass reaction vial. (Col. 4, lines 26-27). A mixture was stirred in the glass reaction vial, and sample aliquots were removed using a Hamilton microliter syringe for GC analysis. (Col. 4, lines 28-34). During collection of the aliquots, a 25 gauge stainless-steel needle (available from Aldrich) was inserted through the septum "to assure exactly 1.0 μ L of liquid was withdrawn." (Col. 4, lines 32-34). While the patent is silent as to the exact purpose for the use of the additional needle, it would be apparent to one skilled in the art that the additional needle is being used to prevent a vacuum from forming during sampling with the Hamilton syringe so that an accurate volume is sampled. The patent is also silent as to the septum being pre-perforated as alluded to by the Examiner. (Col. 3, lines 55-58). The fact that the septum is not pre-perforated is not significant since it is well known that such septa are commercially available for such reaction vials used in Bartram.

Claim 10 of the current invention is dependent on Claim 1, and Claim 1, as discussed above, is nonobvious under 35 U.S.C. 103(a). As such, Claim 10 should also be nonobvious. Even so, Claims 10 and 11 are not obvious based upon the prior art cited by the Examiner. Bartram teaches the use of a needle inserted through a septum during sampling of a reaction vial for GC analysis. While it could be said that the small tube in Claims 10 and 11 serves to prevent a vacuum that inhibits flow through the junction of the reference electrode, it is not taught or predicted by Bartram that venting as such will produce an electrode with long-term stability of the standard potential. All Bartram teaches is that accurate volumes can be achieved during sampling with a Hamilton syringe by preventing a vacuum from forming in the reaction vial using an additional needle. Neither Frollini nor Pedicini teaches or suggests the use of a vent as taught in Bartram would stabilize the standard potential of the electrode. As such, Bartram, in light of Frollini and Pedicini, does not teach, predict or suggest Claim 10 in the current

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invention will result in a combination pH electrode possessing long-term stability of the standard potential.

Additionally, Claim 11 is dependent on Claim 10 and only describes the size of the tube used. While a tube of such size is available from Aldrich, Aldrich does not teach, suggest or support that this size would result in the claimed invention. Since none of the prior art teaches, predicts or suggests the vent described in Claims 10 and 11 will produce a combination pH electrode with a stable standard potential, these claims are nonobvious under 35 U.S.C. 103(a).

III. Claims 12 and 13 of the current invention are not obvious under 35 U.S.C. 103(a) since the prior art fails to teach or suggest the vent configuration described in Claims 12 and 13 would produce an electrode that possesses long-term stability of the standard potential.

The Examiner combines the teaching of Frollini, Pedicini and Bartram as discussed above with the teachings of US 5,575,769 (Vaillancourt) to conclude that Claims 12 and 13 are obvious. Vaillancourt teaches a combination of septum and needle that prevents debris from being produced during needle passage through the elastomeric membrane septum. (Col. 2, Lines 13-21). The Examiner points to where Vaillancourt describes the "coring" problem that can occur with needles passing through an elastomeric septum, and the use of a pre-slit septum that avoids such problem. (Col. 1, 29-37). The Examiner also points to a commercially available slit septum (Col. 7, lines 62-63), and to septums of known elastomeric hardness (Col. 2, 58-62).

Claim 12 of the current invention is dependent on Claim 1, and Claim 1 as discussed above is nonobvious. As such Claim 12 should also be nonobvious. Nevertheless, Claims 12 and 13 are nonobvious under 35 U.S.C. 103(a) since the prior art cited by the Examiner fails to predict or suggest the desirability of combining the cited

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prior art. While Vaillancourt teaches the use of a slit septum that will reduce the production of debris, and Bartram teaches the use of an additional needle to allow for accurate sampling of a reaction mixture, neither suggest the desirability to be combined to produce a combination pH electrode with stabilized standard potential using a vent constructed from a pre-slit elastomeric septum. While, using hindsight, one can see how such a vent may reduce moisture loss and contamination while allowing enough air to pass through so that the reference junction can flow under gravity, it cannot be said that Vaillancourt and Bartram, in light of Frollini and Pedicini, teach or suggest the described vent in Claims 12 and 13 will result in production of a combination pH electrode with stabilized standard potential. As a result, Claim 12 is not obvious. Furthermore, Claim 13, which is dependent on Claim 12, would also be nonobvious since it only describes a desirable material for construction of the vent. Since none of the prior art teaches, predicts or suggests the vent described in Claims 12 and 13 will produce a combination pH electrode with a stable standard potential, these claims are nonobvious under 35 U.S.C. 103(a).

For these reasons, Applicant respectfully requests withdrawal of the Section 103(a) rejections, and allowance of this application.

FEE AUTHORIZATION

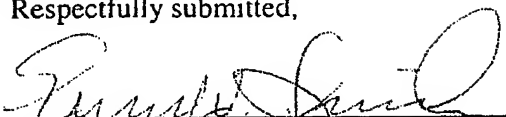
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CERTIFICATE OF FACSIMILE TRANSMISSION

The undersigned hereby certifies that this correspondence was submitted by facsimile in the USPTO on the date shown on Page 1.

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Respectfully submitted,


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